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ABSTRACT

Based on an extensive literature search and interviews with educators, government officials, distance education personnel, and students, this publication reviews the impact of geostationary satellite telecommunications technology on higher education in British Columbia. A systems impact perspective is taken which suggests the emergence of a new educational model, known as the "learning system." A "learning system" is defined as a cooperative framework in which government agencies, universities, community colleges, and provincial institutes work together to deliver distance education through the use of telecommunications networks. The rationale for the case study and its historical context are outlined. Distance education at the Universities of British Columbia, Simon Fraser University, the University of Victoria, and the Open Learning Institute is described as is the formation of the Knowledge Network, an educational telecommunications network. The effect of telecommunications technology on the content of the curriculum and the teaching/learning environment is examined and an assessment is made of the "learning system's" strengths and weaknesses. An executive summary, an outline of case study methodology, a map of British Columbia showing satellite receive sites as of June 1982, and a 67-item bibliography are provided. (Author/ESR)

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Case Study

BRITISH COLUMBIA – HIGHER EDUCATION AND THE INTEGRATION OF A NEW TECHNOLOGY

November, 1983

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Case Study

BRITISH COLUMBIA – HIGHER EDUCATION AND THE INTEGRATION OF A NEW TECHNOLOGY

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i ABSTRACT

The purpose of this Case Study is to give an account of the emergence of the "Learning System" in higher education in British Columbia and to describe the System as it exists at the present.

The term "Learning System" does not describe a formal institution or organization. It is used to describe what happens when a traditional educational structure including government plus universities, community colleges and provincial institutes strive to find a way to work together to deliver "Distance Education" through the use of telecommunications networks.

By focussing on "learning" as the goal and providing an organizing principle to assess how coherent the common goals of institutions are and also how distinct, their uniqueness and individuality is preserved within a cooperative framework. In this way, the "Learning System" represents far more than the sum of its parts. It is "enabled" by the powerful centralizing yet connecting telecommunications systems but it is driven by the need to provide opportunities for learning for adults.

The study describes the kinds of technology that have been utilized to overcome the barriers of geographical and social isolation. Attention is given to the impact of the new technology on the educational institutions and how their organizational structure is being adapted to meet changing social needs. The effect of the technology on the content of the curriculum and the process of learning is also examined. Some assessment of the present weaknesses and strengths of the "Learning System" is given, based upon a series of interviews conducted with educational administrators, instructors and students. Speculation about future developments is made, in particular, likely developments in the use of information technology.

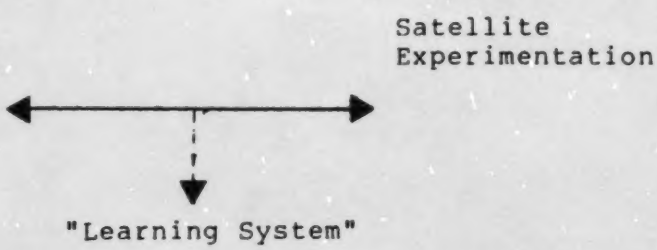
ii EXECUTIVE SUMMARY

Part I outlines the rationale for choosing British Columbia as a Case Study. It is argued that B.C.'s experiments with satellite telecommunications for Distance Education led to a new way for institutions to cooperate in providing learning for adults. A 'systems impact' perspective is taken which provides an overview of the "Learning System" rather than a focus upon any specific institution. The Case Study is limited to a description of the Province's three Universities, the Open Learning Institute and the Knowledge Network, British Columbia's educational communications authority.

In Part II the Case Study notes the historical quest to deal with the problems of providing equal opportunities for learning over vast territories and rugged terrain. Following the lead of the British Open University in the early 1970's, this quest was accelerated and there were many initiatives to establish "Distance Education" as a means to solve the problems of serving a dispersed population. Concomitant with these intitiatives was the development of geostationary telecommunications satellite and their subsequent availability for experimental use by the province's higher education institutions.

These experiments not only proved the ability of the satellite as a carrier of television signals, in a more important psychological sense, they dissolved the problem of distance. Each community was equidistant as long as they could receive the signal.

As these two key thrusts developed, a new model emerged in the 1980's, the concept of the "Learning System", defined as an organizing principle in which many traditional and non-traditional organizations find a way to work together to deliver "Distance Education" through the use of telecommunications networks.



The key goal of this case study is to try and identify the principal initiatives that shaped the development of the "Learning System" and to look at the indicators of change in curricula, the teaching/learning environment and the organizational structures that are evident of the impact of the new model.

Part III provides an analysis of the costs and financing of the five institutions under study, and the details of their budgets for Distance Education projects. Enrolment figures are given in full and part-time studies, and in Continuing and Distance Education courses for each of the institutions. Also given is a description of the characteristics of each institution and its technical capacities.

The impact of the new technology on the content of the curriculum and the process of learning is described in Part IV. A significant finding of this study is that those involved in the use of educational technology are generally of the belief that the introduction of new media of educational delivery has little or no impact upon the content of the curriculum.

Analysis of four programs developed for delivery indicates that certain changes do take place when courses are taken from the classroom setting and adapted or created for Distance delivery. The content of the curriculum or the educational 'product' remains relatively unaffected, but the process of receiving is altered. The Distance Education product is considered to be of excellent quality compared with on-campus courses, but the process of communication needs further refinement, particularly in the interactive component. The need for spontaneous human interaction in the process of learning is emphasized.

The implications of the new information technology on the teaching/learning environment are described in Part V of the report.

The responses of administrators and instructors interviewed for the purpose of the Case Study are summarized, listing their common perception of and concerns about British Columbia's "Learning System", and especially the Distance Education programming with which they are involved.

The impact of the new technology on the internal and external structural organization of education institutes is examined. A finding of this Case Study is that, although there is some recognition of the need for organizational changes to take place, change takes place gradually and is often not understood by traditional institutes. There is evidence of gradual change taking place: of increasing

recognition of distance education needs, use of the new technology, particularly interactive technology, and increased inter-institutional collaboration. However, further openness and responsiveness to new developments is seen as a necessary concomitant of organizational change. The role of the Learning Systems Working Group and the Knowledge Network in ensuring collaboration and co-operation amongst participants within the system is outlined. The term 'co-operative individuality' is used to describe a system which maintains a balance between centralized and decentralized authority.

Some of the interesting trends and emergent patterns identified in this study have potential to cause integral change in the next ten years.

1. Increasing inter-institutional co-operation. Using the organizing principle of 'co-operative individuality' institutions in British Columbia are striving to find ways to work together while retaining their autonomy and distinct uniqueness.

2. Increasing involvements of adults of all ages in less traditional learning opportunities.

3. Disproportionally small amounts of funding to support these less traditional activities.

4. Increasing use of technological 'networking' in video, audio and computer as a complement to the human networks. This use of 'connection-making' technology supports the move to increased co-operation and the move to smaller, human scale involvement linked together by technology. In the last two years, most Distance Educators have moved to the use of audio-conferencing for administration and planning and are now interested in computer conferencing.

5. Small but significant shifts in organizational structure in support of the new systems.

6. Small but growing tendency to use materials and technology designed for Distance Education, in the campus environment and a blurring of distinction between the methods of course delivery.

The "Learning System" described in the Case Study is highly complex and multi-dimensional, and it is undergoing continuous modification as assessment is made of its operations and improvements are implemented. It is hoped that the move towards increased openness, collaboration and co-operation will continue into the future so that the system will be optimally effective in serving the educational needs of the people of British Columbia.

iii RESEARCH METHODOLOGY

A. An extensive literature search was conducted, as indicated in the "Bibliography".

B. Face-to-face interviews were conducted with the following: Five senior administrators, concerned with the Distance Education programs within their respective institutions.

Dr. Ian Mugridge, Dean of Academic Affairs,
Open Learning Institute

Mr. Brian Gillespie, Dean of Health,
British Columbia Institute of Technology

Dr. Glen Farrell, Director, University Extention,
University of Victoria

Dr. Robert Smith, Vice President, Academic
University of British Columbia

Dr. Jack Blaney, Vice President,
University Development and Extension,
Simon Fraser University

C. For the historical context of the Case Study, the following people were also interviewed.

Dr. Walter Hardwick, Chairman and President,
Knowledge Network, former Deputy Minister of
Education, Science and Technology

Dr. Ron Faris, Executive Director, Continuing
Education Division, Ministry of Education

Mr. Dean Goard, Director, University Programs,
Ministry of Universities, Science and Communications

D. Distance Education personnel were interviewed:

June Landsberg, Knowledge Network Co-ordinator, Simon Fraser University

Alexandra McGregor, Manager, Learning Design Services, Knowledge Network

Michael Reddington, Manager, Utilization Services, Knowledge Network

Dr. Margaret Haughey, University Extension, University of Victoria

Arlene Zuckernick, University Extension, University of Victoria

E. The following University of Victoria instructors were interviewed

Dr. Geoff Potter, Educational Technology

Dr. Jane Garland, Nursing

Lucille Rudiak, Public Administration

Dr. Peter Hitchcock, Computer Systems

Jeanette Muzio, Computer Systems

F. Statistical information was supplied by:

Dr. Monique Layton, Universities Council of British Columbia

Dr. Dennis Foth, Director of University Extension, Simon Fraser University

Dr. Colin Yerbury, Director, Directed Independent Study Courses, Simon Fraser University

G. Telephone interviews were conducted with five Distance Education students in the Nursing program of the University of Victoria. These students were selected because they had extensive experience of Distance Education Study in a variety of modes over a period of several years. Names were drawn from class lists held by Dr. Faith Collins of University Extension, and participation was voluntary.

I RATIONALE FOR THE CASE STUDY

1.1 The development and growth of the system of further and higher education in British Columbia is an involved and interesting one that has been affected by a series of changes in government policy, educational philosophy and the creative initiatives of several key individuals. It is a history that is still 'in the making', for, as the nature of post-industrial society undergoes changes, the educational needs of the people and the means available to meet that need also change, and so evolves a new kind of learning system. This study captures a developing system at one point in its evolution; it reflects the system as it is in 1983 and seeks to explain how it came to be that way and how it might appear in the future.

Whereas the term "Learning System" will be used to describe the conceptual framework, Distance Education will be used in this report to describe the practice. The technology whose impact will be assessed are geostationary, telecommunications satellites, used for the delivery of television signals over a large geographic area. These signals are received by television receive-only (TVRO) "dishes" and retransmitted by cable television to peoples' homes throughout British Columbia.

British Columbia has sought innovative ways to advance the ideals of democracy and equal opportunity through education. The last eight years have witnessed the birth of two separate open learning and Distance Education bodies and the rapid development of quantities of high quality materials and multi-media packages. The last three years have seen the involvement of the whole post-secondary system in delivery of learning systems through satellite telecommunications.

Its pioneering experiments in the use of communication satellites for educational television eventually led to the development of the Knowledge Network. For these reasons, B.C. makes a suitable subject for a case study on the impact of new information technology on education. Whilst it is, in some senses, a unique case, many other provinces, states and countries are faced with similar problems and questions at this time, and it is hoped that a valuable purpose will be served in this sharing of British Columbia's experience.

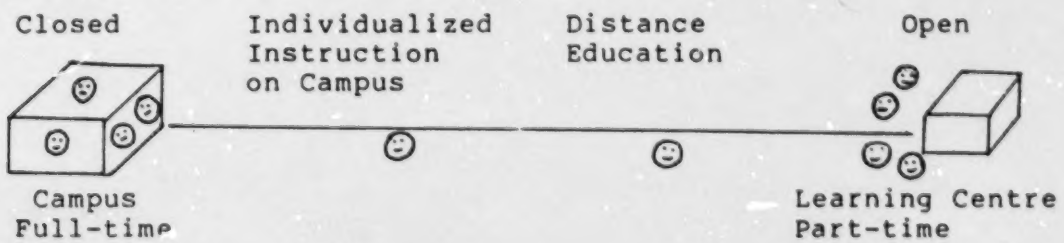
A SYSTEMS APPROACH

1.2 General systems thinking distinguishes between 'open' and 'closed' systems. A system is open if some exchange takes place between the organism and the environment, if it is closed, no such exchange takes place. In the educational context, an open system is one which facilitates human learning by providing access to learning resources that were previously inaccessible. It also concerns itself with the human process of learning. As such, an open system approach to learning must, in a cybernetic sense, deal with its own impact on the environment and the environment of those who want to learn.

The concept of the "Learning System" as it is emerging in British Columbia reflects both these views. However, unlike the open learning systems approach of the Open University, this system is a hybrid. It serves a conceptual framework for a number of traditional and non-traditional institutions to learn to use new technology and explore its impact.

Types of education can be seen on a continuum ranging from the traditional "closed" environment where students attend classes: on a full-time basis in schools, colleges, or universities, through individualized learning on campus, to distance learning, and, at the other end of the continuum, open learning. There students have ready access to knowledge in which they engage on a part-time basis either at learning centres, at home or in impromptu groups. (Table 1.0)

Table 1.0 A Continuum of Service



Towards a Life-long Learning System

As one moves along the continuum from a traditional 'closed' model to a non-traditional 'open' model of education, the relationship of the learner to the institution and of the learner to the instructor changes. The focus of the student in that environment also changes. Most students who use the non-traditional systems are part-time; course work is only one aspect of their lives. In the conventional campus environment students are usually full-time. The thrust to provide opportunities to those part-time students

has spurred the use of telecommunications. The adaptation of a similar approach in the Campus setting is only just beginning.

1.3 The introduction of new technology creates new roles for educators. Much of the research in open learning systems has been an attempt to identify the human roles in the instructional process. One conclusion is that students have to 'learn to learn' and to learn to gain access to knowledge. The need for a human interface has not, however, diminished. All the indications are that learning is a social phenomenon and that people need contact with other people in order to learn.

Rather, it is the human interface that should change to being a more personal, individual and totally available consultative resource and the need for contact should increase as more people partake in educational activities. Thus, the introduction of the technology should create more jobs for educators. It does not usurp the work of the teacher; it does, however, have the potential to transform that role.

> The effect of well-applied technology will be to improve instruction - but the effect of improved instruction is almost always to put greater demands on the creative teacher ... What can we hope for from the introduction of technology is not a saving of manpower but of mind-power. (Kirkland, 1971)

The human role involves enthusiasm, guidance, enjoyment and love of people; the new educator must be well-versed in problem-solving, learning to learn and the use of instructional technology. These humanistic characteristics will be necessary to complement the often depersonal, linear characteristics of the new information processors and the 'fear of the unknown' that the idea of computers present to people. The human interface will be particularly important if a totally mechanistic approach to artificial and natural intelligence is to be avoided. (Forsythe, Hart, 1980).

Humans will continue to help each other learn. But for education this will involve a change of thinking about education and the role of teachers. Change of thinking is the first challenge for the human interface. The new learning systems require self-learning and responsibility, and the role of the human interface is now more crucial than ever before. As more and more information is available in the home, so that more people can be served without the need for campus attendance, the locus of learning will change in importance.

> "The university will grow smaller as it grows larger and the university will be everywhere and the campus nowhere." (Thompson, 1977)

This affect on the "environments" for teaching/learning is another aspect of change made possible by the use of technology. The diversification of approaches promises to revitalize and reform higher education.

Although traditional models still dominate the teaching/learning environment in British Columbia, all the elements of the continuum necessary for the life-long learning system are in place. Although fragile in both budget and institutional commitment terms, the emergent system in British Columbia draws strength from the widespread involvement and the diversity of the approach. It has the requisite variety to become a viable system. However the "Learning System" is not formally mandated as a separate institution. Rather it is a conceptual framework for the organizing principles that the institutions have chosen to use as they explore new ways to co-operate and new ways to use telecommunications to alter their teaching/learning environments. (Beer, 1981, 1982)

As with all complex environments, the emergence of the new idea is not a linear progression.

> "A line of events has a beginning and an end, but the matrix out of which events arise, does not appear to be an event at all." (Thompson, 1981)

The desire to equitably serve a widely scattered population has always been the objective. The recent widespread availability of "connecting" technologies and "networks" has led to rapid system-wide indicators of change.

The Environmental Context

1.4 British Columbia is the third largest of the Canadian provinces, having a population of approximately 2.75 million distributed over an area of 948,544 square kilometres. Almost 60 per cent of the total population is concentrated in the southern coastal areas of the Mainland and Vancouver Island, close to the United States border. There are some pockets of high density population in the central interior valleys, but much of the extensive territory of B.C. is unpopulated wilderness.

The climate displays some marked contrasts, the southern coastal areas and central interior valleys having moderate conditions, whilst the northern interior suffers seasonal

extremes with intensely long, cold winters. Thus the natural phisiographic and climatic conditions play an important part in the distribution of the population.

It is a challenge to the educational system of British Columbia to provide learning opportunities for the 40 per cent of the Province's inhabitants who are scattered over immense distances, isolated by the physical barriers of mountains, sea and extremely harsh weather conditions. It is an even greater challenge to ensure that the educational provision that is made is not of inferior quality to that enjoyed by the city-dwellers. Those people involved in Distance Education pursuits in British Columbia believe that the physical barriers to higher education have been overcome, and that the educational courses offered are of equal quality, and in some instances, superior quality, to those offered in a campus environment.

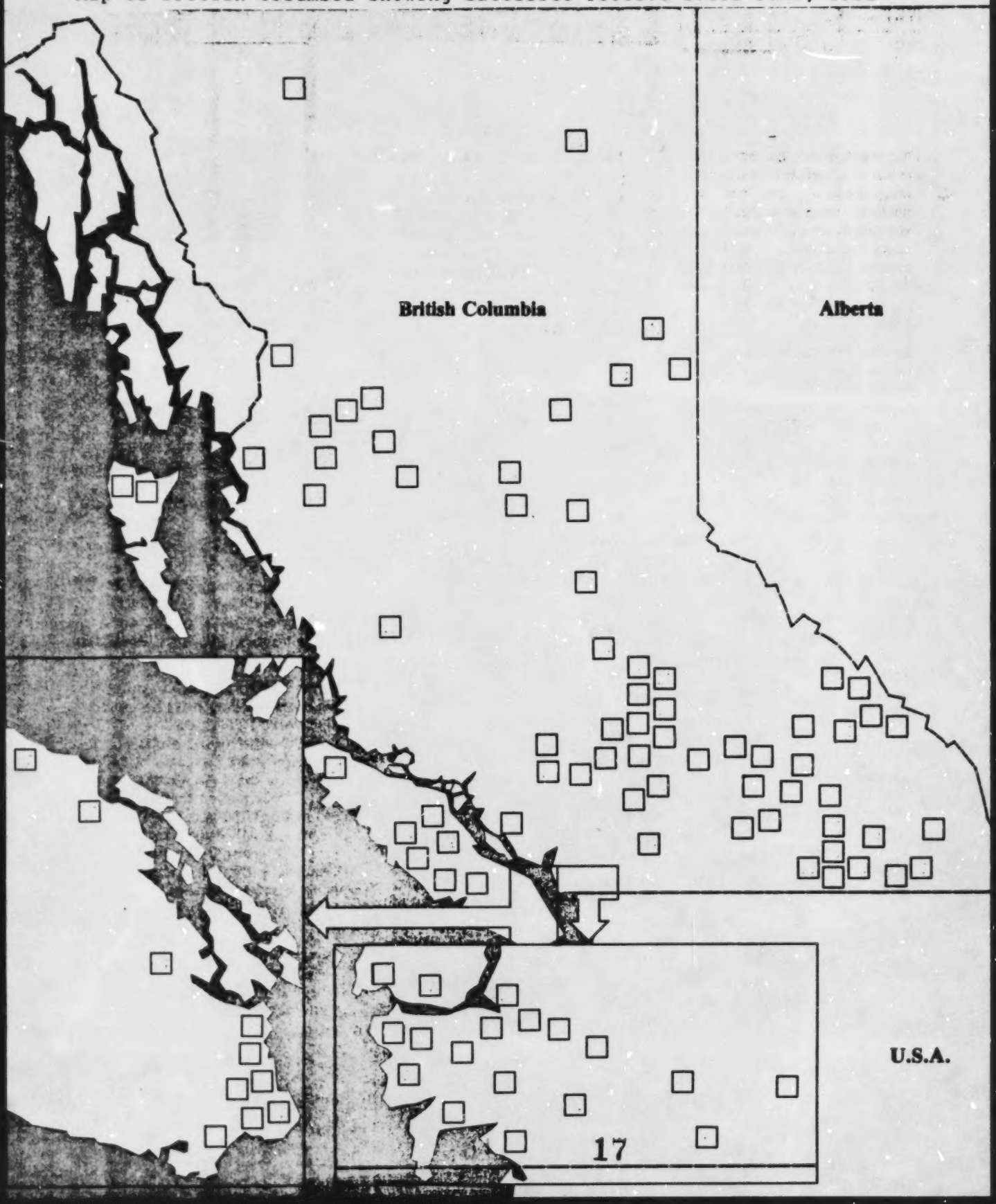
British Columbia's three universities are all situated in the south-western coastal corner of the Province. The University of British Columbia (UBC) and Simon Fraser University (SFU) are located in Vancouver, and the University of Victoria (UVic) in Victoria.

In addition, the post-secondary system has fifteen two year regional community colleges and seven specialized provincial institutes. At least two use learning systems and Distance-Education exclusively (North Island College and The Open Learning Institute) and all of the others are involved in some fashion with the "Learning System" either through provision of Learning Centres or through course support for telecourses offered through the telecommunications network.

The Province recently established the Knowledge Network, to help initiate and co-ordinate activities using new information technologies. Through the organizing principle provided by the Knowledge Network, all 15 colleges, 3 universities and 4 institutes are involved in Distance Education using satellite delivery that can currently be received by 85% of the Province's population.

The organizing principle is described as "cooperative individuality". Using the logic of coherence and the logic of distinction, institutions are able to decide when they must cooperate and when their individual differences should be emphasized. In this way a creative tension or "synergy" is established in the central/de-central debate and competition is placed within the over-arching cooperative goal of the "Learning System". (Pask, 1980)

Map of British Columbia showing satellite receive sites June, 1982



II THE HISTORICAL CONTEXT

2.1 Canada has an interesting history of "passionate educators" who have pioneered many innovative and challenging means to meet the educational needs of widely scattered often isolated communities. Whether radio, telecommunications or satellite, float-plane or "downtown study-centres" the stories permeate the history of all our provinces. (Faris, 1975).

The Government of British Columbia, whatever its political stripe has always been committed to the goal of education over distance and this level of support at senior levels has been vital to the continued development of a Distance Education system. Few other Provinces in Canada have enjoyed such uninterrupted political commitment to the provision of learning at a distance. (The term "Distance Education" has only been in common usage for this activity for the past 7 or 8 years.)

2.1.1 Since the 1920's, British Columbia has sought new and better ways to bring educational opportunity to the learner at a distance, always with a careful observance of ventures taking place elsewhere in such places as Great Britain, California, Ontario and Quebec. This included significant involvement in use of radio in the 1930's and 40's.

2.1.2 By the late 1950's there was debate as to whether the system in British Columbia should be established as an integrated one with a central locus of control, or a diverse system with self-governance of the separate and newly-created institutions. John Macdonald, then president of the University of British Columbia, envisioned the latter. It was the report conducted by Macdonald in 1962 entitled 'Higher Education in British Columbia and a Plan for the Future' that provided the basis for a decentralized post-secondary education system of community colleges and universities. The report recommended the rapid expansion of opportunity in higher education in B.C. in terms of both diversity of content and geographical dispersion to meet the expected increase in student demand of the coming decade. Recommendations were made for the establishment of several degree granting colleges in metropolitan and rural locations to overcome the barriers of distance.

2.1.3 In the early 1960's, a time of rapid technological expansion, the potential for the use of radio and television for Distance Education delivery was recognized, but the rugged, mountainous terrain of British Columbia meant that delivery costs were high, and reception in some remote locations would be difficult or impossible, so the idea was laid aside.

Individual initiatives were made, however, by certain institutions, with the University of British Columbia in the vanguard. By the late 1960's UBC had created an institutional services centre, fully equipped for audio and video production. By the mid 1970's the University of Victoria and Simon Fraser University were involved with the University of British Columbia in a demonstration project concerned with technological and organizational issues pertaining to Distance Educution.

British Columbia has a history of central governance of education, following the British tradition. Administration of the Provincial education system from the 'top down' remained, with only minor alterations into the 1960's. But in the mid and late sixties, the public consensus upon which the system rested had begun to change, and by the early 1970's major structural pressures were being felt. Reflecting changing circumstances, the Department of Education began to release its central control. (Hardwick, 1983)

2.1.4 The 'decentralization' issue became most pronounced following the 1972 general election, which saw the installment of a New Democratic Party (NDP) government, and a transformation from an 'authoritarian' to a 'participatory' model of education.

This brief period from 1972-75 saw keen interest in de-centralization and means to achieve it. Reports were commissioned on a Communications Policy and the Open University model was investigated. However, the College Task Force Report of 1974, "Towards the Learning Community", really set the stage by describing how Colleges could be regional centres and promoting non-traditional approaches for four new colleges. Only one of these colleges, North Island College, fully accepted the challenge and established itself as an open learning system using a learning centre approach with no central campus. This was the first full non-traditional "model" to emerge. During this period, the Provincial Education Media Centre, (PEMC) developed its first television projects in the post-secondary sector.

2.1.5 A change in government in 1975 from N.D.P. to Social Credit (S.C.) followed an election in which education was a principal issue. The newly elected cabinet reacted to public concern about education by re-asserting central authority. Education Minister, Dr. Patrick McGeer, gave support to measures to re-assert standards in the classroom, fiscal restraint, and an expansion of vocational training programs.

The centralization/decentralization issue continued to be argued and at this time the Deputy Minister, Walter G. Hardwick, proposed a co-management model as a third alternative. The aim was to design a system that could, on the one hand encompass diversity, and on the other provide cohesion sufficient for the system to meet its principal mandate, to serve the learning needs of the people of British Columbia. Educational delivery was regarded as a system and all the participating agencies were to be drawn into a systems design. However, the proposed co-management model, which sought out the middle-ground between the extremes of centralization and decentralization was not generally accepted. (Hardwick, 1983)

2.2.0 A number of reports on social and geographic barriers to learning and proposed solutions to overcome these obstacles were commissioned by the Ministry of Education between 1975 and 1979. In 1976 the Ministry of Education introduced a Province-wide co-operative system of Distance Education, the specifics of which were described in March 1977 by Deputy Minister Hardwick in 'Co-operative Plan for Distance Learning'. Again, this was not accepted by the education institutions. (Education Today, Vol 3. No.6)

2.2.1 The communications technology satellite, 'Hermes' (named after the messenger of the Greek gods) was launched in 1976 as a co-operative venture involving NASA and the Canadian Department of Communications. British Columbia joined in experiments with the Hermes project in May 1977, organized by of the Distance Education Planning Group. However, by the end of that year, the Provincial Government had launched a satellite-tele-education project (S.T.E.P), which brought together most of British Columbia's universities and colleges. Sixty-four hours of colour programming at six sites went out over an eight-week period, with a telephone facility for interactive communication between instructors and students. The experiment had its successes and its failures, as Potter writes

> In some cases Hermes brought people together in a way that was every bit as emotionally moving as it was intellectually stimulating. In other cases students became bored, technical problems made effective interaction impossible, information seemed colourless and static. (Potter, 1981)

However, the ramifications of the Hermes project were immense. "One may reasonably conclude that this single but powerful satellite significantly altered Canadians' perceptions of their country, their access to information, and their ability to share their cultures." (Potter, 1981)

2.2.2 In the same year as the launching of the first tele-communications satellite, the Weingard Commission was established by the Minister of Education to advise on the delivery of academic and professional programs outside the metropolitan districts of Vancouver and Victoria. The Weingard study, 'Report of the Commission on University Programs in Non-Metropolitan Areas' was submitted to the Ministry of Education in 1976. One of the principal recommendations of the Commission was that outreach and directed study programmes be made available for students in the interior of B.C. who were undertaking degree programmes.

2.2.3 Also, in June 1976, the Ministry had set up a committee, chaired by Dr. Ron Faris to study and recommend future policy on funding, administration and programmming for Continuing Education. The 'Report of the Committee on Continuing and Community Education in British Columbia' was presented to the Ministry of Education in December 1976. The 1971 census was cited to show that only 16% of the British Columbian population over the age of 15 had completed Grade 12. The level of education tended to be higher in urban than in rural areas. Therefore, the committee recommended that there was a need to strengthen basic educational opportunities, especially in rural communities.

2.2.4 As a result of a report presented in 1976 entitled 'The Needs of Libraries and Post-Secondary Education in British Columbia', the Ministry of Education provided funding for a Provincial union catalogue detailing university and college library holdings and an inter-library loan system amongst the various institutions. This provided greater accessibility to library materials for students and faculty residing outside the Lower Mainland.

2.2.5 However, the study that made significant impact upon the development of the learning system was the 'Report of the Distance Education Planning Group on a Delivery System in Distance Education in British Columbia', which appeared in 1977. The Distance Education Planning group, led by Patricia Carney stressed the need for more Distance Education programs in the Province, paricularly in Community Education, Basic Education and Vocational Training. The study outlined a number of barriers to the implementation of Distance Education and made several recommendations for the development of Distance Education and delivery systems. The primary goal of the proposed delivery system, it stated, was to provide Distance Education. A secondary objective was to provide the basis for a Province-wide communication system, which should be co-ordinated, flexible, multi-modal and interactive.

Further, the Carney Report recommended the establishment of a new institute or agency to assume provincial responsibility for the delivery of Distance Education in the Province. Thus the Carney Report can be seen as playing a major role in the subsequent development of the Open Learning Institute (1978) and Knowledge Network (1980), each of which carries out some aspects of these functions, one as an institution, the latter as a telecommunications network.

2.2.6 Canada's Anik-B satellite was launched in 1978, designed to bring about the transition from experimental to operational satellite systems. Located in geostationary orbit 36,000 km above the earth's surface in approximately the same area as Hermes, this satellite provides channels in the same frequency bands as Hermes (6/4 Gz.) Thus, the exploration of the use of small, relatively inexpensive earth stations that had begun with Hermes, continued with Anik-B. Experimentation with Anik-B has been extensive. It has been used by Ontario and Alberta, as well as British Columbia's Knowledge Network, for delivering their Distance Education programs.

2.2.7 The last major report to appear in the 1970's was the Dewey study on 'Link of Institutions for Video Education' (1979) by John Dewey, Dean of Graduate Studies of the University of Victoria. The major recommendation was that the Provincial Government should set up an interactive television microwave network to provide increased access to educational programs. It was proposed that the teaching hospitals in Vancouver be linked to the University of British Columbia, and that the law courts in Vancouver and Victoria be linked to the network. Such a network would enable a sharing of programs and expertise amongst the institutions and provide new opportunities for professional development. These kinds of services are currently being supplied by the Knowledge Network's subsidiary, Knowledge-West using a broad-band cable network service.

Whatever action may or may not have taken place to implement the recommendations of these five government reports, they were valuable in stimulating consideration of the system of delivery of education to be introduced in British Columbia. Their production served to create public awareness of the issues and to allow decision-makers to identify the means by which the system could be introduced and the personnel who could assist in its creation.

2.3 Two points are worthy of note in this connection. First is the recognition that the birth of the "Learning System" that has been identified in this study has been a lengthy and gradual one, that would not have been possible without the political commitment of successive government parties and leaders with a clear vision of why such a system was necessary.

Second, it should be understood that, although a variety of discoveries were being made simultaneously during the last decade, sociological, educational and technological, it was the philosophical ideal of equal educational opportunity for all which was the driving force behind the creation of the system as it exists today, and not technological determinism. The technological innovations were a means to an end, serving to 'open the door' to learning for a dispersed and educationally disadvantaged population, helping educators to overcome the barriers of distance and terrain.

It was never the case that the availability of the technology dictated the kind of educational service that was developed. However, it could be argued that it was the arrival of the technology that brought together these emergent ideas by actual demonstration. The many reports served to alert the educational environment; the opportunity to experiment with technology led to the development of new working models.

If we plot the reports on a matrix:

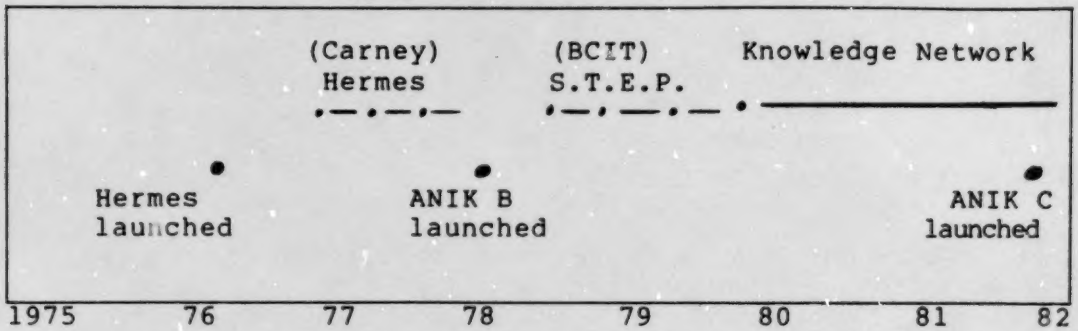
Table 2.0 Some of the Significant Government Reports and Surveys on Media and Provision of Learning at a Distance 1974-79

```
82|
81|
80| +Knowledge Network
79|                              *Dewey Report
                                 ETC Cablecasting Survey Report
78| +Open Learning            *Carney Report
   Institute                   Needs of Libraries ...
77|                    * Faris Report
76|               * Winegard Report
75| +NIC     * Report on the Open University
74|    *Towards the Learning Community
      Media Services Survey
```

We can see that questioning dominates the 1970's, leading to the emergence of at least two new institutions designed for non-traditional education and a growing interest among the entire educational community in the issues surrounding Distance Education.

We can also look at the emergence of satellite technology for experimental public demonstration.

Table 2.1 Experimental Satellite Use



These experiments lead to the formation of a new organization the Knowledge Network, to co-ordinate the use of and operate the telecommunications network.

2.3 The period 1976 to 1980 had also witnessed some modifications to the internal organization of educational management and a change in Ministers. These modifications included the creation of data bases to provide wider knowledge of the system as a whole, both internally and externally, and a more open system of management. The move towards an open system was resisted by many, but the development and administration of information systems continued into the 1980's after the departure of the Deputy Minister of Education, Dr. W. Hardwick, a driving force behind these measures.

The trends of the 1980's were anticipated and plans were made for a smaller, more versatile and streamlined educational enterprise. It was designed to take account of declining enrolments in schools and emerging needs of part-time learners.

This period also witnessed the increasing involvement of both University of Victoria and Simon Fraser University in Distance Education.

2.4 Whereas the 1970's were a time of critical questioning and the emergence of new technologies, the 1980's in British Columbia have thus far been characterized by new forms of organizational relationship and changes in the teaching/learning environment made possible by technology. Many forces are at play here, not least of which is the emergent concept of the "Learning System" as the meta-organizing principle for the delivery of adult learning by all the Province's institutions of higher education.

Since 1980 the concept of the "Learning System" has meant increased collaboration among institutions as well as a growing involvement in non-traditional methods of educational delivery. The main challenge of such a "Learning System" is delivery, which involves creating many interwoven networks, such as communications, administration and instructional systems, which are at once flexible and responsive to the students.

2.5 Although the eventual outcome might not have been predictable, it is arguable that the emergence of the "Learning System" in British Columbia could not have been projected or planned in a more rigorous fashion. It benefited from the experiences of others whose ideas dominated the 1970's such as the Open University and Canada's TVOntario, but these were always considered in the context of British Columbia and its geography.

This environment was focussed by the availability of one particular technology satellite telecommunication. However, environmental change is not technologically determined. Of greater significance is the way the technology is utilized. The organizing principle used to define the new relationships created as a result of the new technology provides a new model not feasible without the aid of the technology itself.

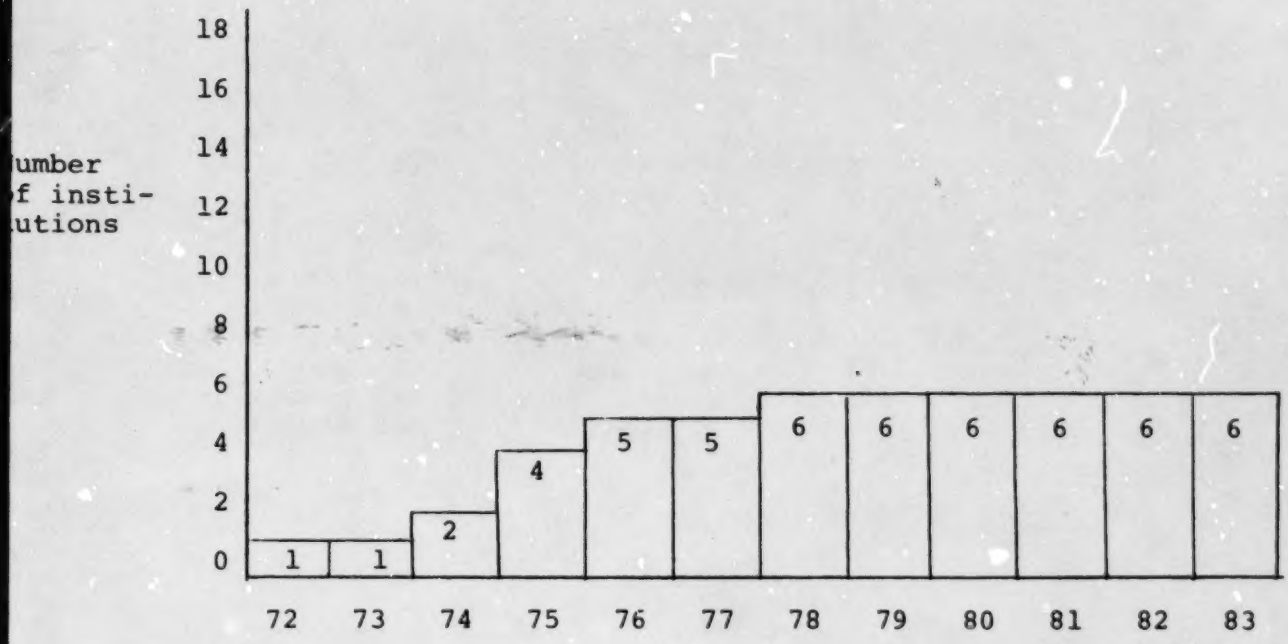
If we consider the emergence of other technologies during this time period, such as the personal computers (Apple II, 1977-78) computer conferencing (EIES network, 1978) and widespread use of audio-conferencing, we can, with historial hindsight, question what are the criteria that cause one technology to catalyze widespread change in an education system and also wonder about the indicators of that change.

These final tables (Table 2.3.1, 2.3.2) endeavour to show that the increasing involvement of British Columbia's post-secondary system in Distance Education is directly linked to the processes and history we have just described. The key indicator is institutional involvement. The result is the "Learning System" model. The opportunity was the availability for experimental use of satellite telecommunication to overcome the barrier of distance in educational delivery. This "hands-on" experience by many institutions has begun to significantly alter the perceptions of many educators.

Table 2.3.1 reflects the growing commitment to Distance Education regardless of technology by six institutions.

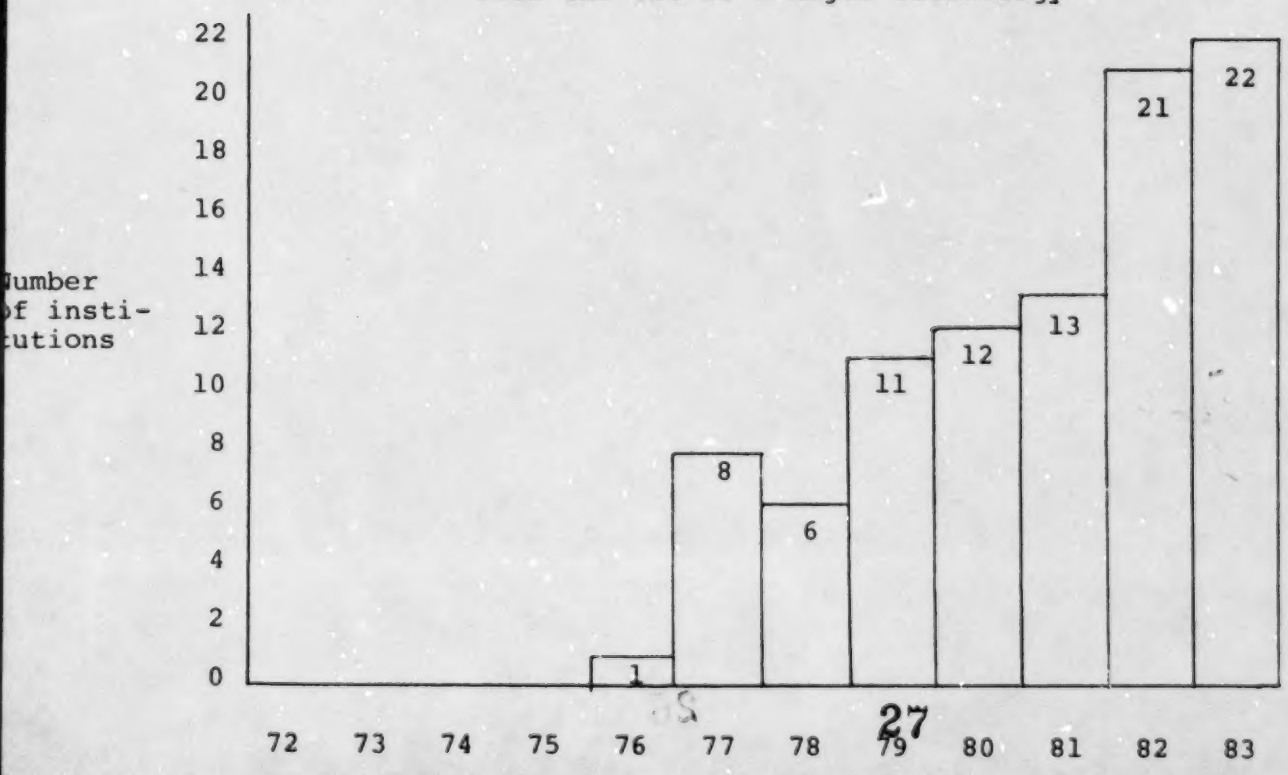
Table 2.3.2 shows the growing involvement in Distance Education of all the other post secondary and higher educational institutions through their involvement with using the satellite services provided by the Knowledge Network.

Table 2.3.1: Institutions Involved in Distance Education without Use of Major Technology



(UBC 1947, BCIT 1975, NIC 1975, SFU 1975, U.VIC 1976, OLI 1978)

Table 2.3.2: Institutions Involved in Distance Education with the Use of a Major Technology



III THE INSTITUTIONAL CONTEXT

3.1 As detailed previously, the needs of adult learners in British Columbia are provided for by a number of different post-secondary establishments using a continuum of delivery technologies.

In terms of student characteristics, those learners who are at a distance differ from full-time, on-campus students, in certain respects. Distance Education students are approximately 10 years older, generally in their early 30s. They are usually fully-employed, have families, and may be involved in community activities. Sixty per cent are female. Frequently they have been out of the educational system for some years and therefore approach the learning task with great anxiety and feelings of unfamiliarity. Often they are isolated in small towns and in need of human contact for support and the sharing of ideas and problems. Generally, courses are taken to gain credit for professional development, or for personal enrichment, stimulation and growth. Distance Education students are well-motivated and determined to overcome the obstacles to learning. It has been pointed out that Distance Education students have to be well-motivated and self-directed in their approach to studying in order to succeed, for, unlike the face-to-face classroom setting, there is no-one there to force or cajole them into doing the work. Instructors and tutors do their best to encourage and help their students to learn, but this is not an easy task to do through a television screen or at the end of a telephone.

Support services are provided to Distance Education students by all the institutes involved in the form of telephone conversations with instructors, special library services, learning centres and other services.

Currently, the provinces' fifteen colleges are providing Learning Centres both for their own students as well as for students participating through the telecommunications network. It should be noted that the Universities and the Open Learning Institute do not use only the satellite system in Distance Education, but also audio-conferencing and are contemplating computer-conferencing, in addition to print-based courses and audio-cassette. No one form or model of Distance Education dominates in British Columbia and examples may be found of a variety of approaches.

3.2. THE UNIVERSITY OF BRITISH COLUMBIA

The University of British Columbia is the oldest of the Universities, established in 1915, and it offers a comprehensive range of academic and professional programs. The total number of students enrolled in full and part-time studies at the University of British Columbia in 1982-83 was 27,309. A further 43,671 students were engaged in Continuing Education Programs. Of these 1,659 were enrolled in Guided Independent Study (G.I.S.) courses. Fourteen hundred and seventy eight were registered in the degree program, 40 in the Certificate and Diploma courses and 141 in non-credit courses. Sixty percent of Continuing Education students are female, 40% male. The majority of Continuing Education students (80-85%) reside in the Greater Vancouver area.

University of British Columbia's Centre for Continuing Education is responsible for management of the University's correspondence program. Students enroll on a part-time or full-time basis for credit and non-credit courses at undergraduate or graduate level. Programs are offered in the Arts, Education, Forestry, Learning Skills and general interest courses. Ninety percent of the curriculum materials are in print format, sometimes supplemented with audio-cassettes. Since 1981, Telecourses are also offered through the Knowledge Network.

Since the inception of the Open Learning Institute in 1978, the development of new Correspondence Courses has been curtailed, and instead, existing programs have been revised and updated. In 1979, programs in Education and Forestry were developed and offered through the Knowledge Network and further courses are being created at present.

Distance Education courses at the University of British Columbia are supported from the University budget (25%) and student fees (75%). The University of British Columbia receives a grant from the Ministry of Universities, Science and Communications for program delivery. Little of this budget is allocated to Distance Education programs, and continuance of funding for the development of the education program comes from the non-Metropolitan programs; a special grant from the Universities Council of British Columbia. This source of finance is ongoing. Nevertheless, the University has recently begun to centralize its efforts in Distance Education and the use of new technology and to concentrate on learning systems development in specialized professional disciplines. The emergence of a campus cable grid and sophisticated data networks further characterize some of the highly innovative approaches emerging in this most 'traditional' environment. Work in Biomedical Communications has been highly advanced and all five teaching hospitals are electronically linked to the universities.

Technical facilities include at least four television studios, (one originating "live" for the Knowledge Network) a major campus cable grid allowing for both a video and data network that is linked to a broadband cable network.

Universities of British Columbia

Sample of Programs offered using Satellite Technology, 1983-84

Continuing Dental Education.

Education 317 - The Exceptional Child in the Regular Classroom

Education 312 - An introducation to the Study of Exceptional Children

Acute Neurological Nursing Assessment

3.2.1 SIMON FRASER UNIVERSITY

Simon Fraser University on Burnaby Mountain was established in 1963 and offers undergraduate and graduate programs to the doctoral level. The number of full and part-time students enrolled in 1982-83 was 12,196. More than 20% of Simon Fraser's total student enrollment is in their credit and non-credit Distance Education courses. Simon Fraser University has had two-and-a-half years of involvement with Directed Independent Study Courses (DISC) which offers a still expanding program of over 30 credit courses for learning at a distance. Its main offerings are in Criminology, Education and Kinesiology, with supplementary courses from the Faculty of Arts and the Faculty of Science. DISC courses are primarily print based, some also include audio and video tapes. The Knowledge Network supplies support materials for some DISC programs. Ninety eight undergraduate and 3 graduate programs are offered.

The non-credit courses are managed by the Department of Continuing Studies. These consist of packages of print materials, audiotapes, videotapes and slides which are made available for use at workshops, seminars and conferences at convenient locations throughout the Province.

Sixty percent of Simon Fraser's Distance Education students are female, 40% male. The median age for the group is 29. Thirty-four percent of these students reside in the Interior of British Columbia and on Vancouver Island. The remaining 66% live in the Lower Mainland.

Simon Fraser has always been characterized for its innovative and flexible approach to education. Its involvement with new technologies includes use of Knowledge Network, audio-conferencing and computer networks.

Simon Fraser University

Sample of Programs offered using Satellite Technology, 1983-84

Apiculture, An Introduction to Beekeeping

History 338-3 The World at War

Movement Education

Cultural Conferences in Education

Women and Violence

3.2.2 THE UNIVERSITY OF VICTORIA

Formerly a two-year college affiliated to the University of British Columbia, the University of Victoria came into being in 1963. Like the other two universities, the University of Victoria has strong research programs and offers undergraduate and graduate degrees to the doctoral level. Ten thousand nine hundred and fifty three full and part-time students were enrolled in 1982-83 and approximately 450 more students were registered in Distance Education courses. The distance learners are generally in their early thirties and 60% are female.

The University Extension Division of the University of Victoria is responsible for co-ordinating Distance courses, in consultation with each Faculty and School of the University. Since 1976 the University Extension Division has offered part-time degrees, professional development and community education courses through a variety of Distance Education methods including television, telephone, video and audio-cassettes, and print. Approximately 60% of information is delivered via television and 40% is print based. Computer-based delivery methods are likely to be used increasingly in the future.

Nursing, Social Work and Public Administration are the principal discipline areas for distance delivery. Periodically courses are offered in Child Care, Education and Arts and Sciences. A new course in Computer Based Information Systems is offered for the first time this year. Most of these courses are taken for credit. A comprehensive support service is available to students and includes telephone links with instructors and a Project Manager, some tutors in the field and, for degree students, a free information line to library services.

Funding for the University of Victoria's Distance Education courses comes from a variety of sources: the base budget of the University; the University Council's Interior programs fund; special project money; program budgets of faculties; and from outside grants and foundations. There is no certainty about the continued funding of Distance Education projects from any of these five sources in the future.

There is a television studio for live telecasts which are micro-waved to the Knowledge Network for distribution. An audio-conferencing bridge is available for courses and course administration and meetings.

University of Victoria

Sample of Programs offered using Satellite Technology, 1983-84

Nursing 303 - Theories and Concepts in Nursing

Administration 404: Political Analysis, Structure and Process of Government in Canada

Computer Based Information Systems - The Foundation Course

Administration 451: The Legal Basis of Public Administration

3.2.3 THE OPEN LEARNING INSTITUTE

The Open Learning Institute was established in June 1978, designed to provide for the 'unmet needs' of education in the Province (detailed in Section 2.1). It offers programs in three areas: Adult Basic Education, Career-Technical-Vocational subjects; and Bachelor of Science and Bachelor of Arts degrees. All of the activities of the Open Learning Institute are developed for learning at a distance. The organizational arrangements include six advising centres at Kelowna, Prince George, Victoria, Terrace, Nelson and Kamloops, as well as the administrative headquarters in Richmond in the Lower Mainland.

During the year 1982-83 there were 3,913 enrolments in three semesters. In terms of student characteristics, the median age of OLI students is 34. Approximately two-thirds of the student body are women. Sixty six percent of this group resides in a non-metropolitan area. OLI students are those who cannot take advantage of the existing system of public education owing to reasons of distance, work, physical handicaps and so on.

Most of the curriculum materials are in the form of print packages, so that OLI courses are similar in kind to traditional correspondence courses. The Open Learning Insitute has offered, in conjunction with other institutions, telecourses via the Knowledge Network. In some courses, audio-cassettes are used as a supplement to print materials.

Two approaches are taken to course development at the Open Learning Institute. Existing course material may be purchased from other institutions involved in Distance Education and 'prefaced' for use by OLI students. Otherwise, contracts are made with individual course writers, and the copyright retained by OLI. More than one hundred original courses have been developed at OLI and these programme packages may then be sold to other institutions. Subject areas are in Adult Basic Education, Career-Technical and Vocational as well as University courses.

There are inter-institutional arrangements for the joint development of new Distance Education courses between the Open Learning Institute and Athabasca University in Alberta, Simon Fraser University and North Island College in B.C.

Support services to students are provided through telephone contact with tutors and advisors, library services and laboratory arrangements with various community colleges throughout the Province.

3.2.4 THE KNOWLEDGE NETWORK

The Knowledge Network of the West Communications Authority was established in 1980. Its three primary mandates are:

1. To establish, maintain and operate a telecommunications network for the educational institutions.

2. To co-operate and collaborate with the educational institutions in the delivery of educational opportunities.

3. To foster, stimulate and participate in the development of high quality learning systems.

The Knowledge Network uses the ANIK C 14/12 Ghz satellite, community cable television, microwave and broadband cable in its sophisticated networks. It currently provides 98 hours a week on its public television service to 150 communities throughout British Columbia. This represents carriage of schools programming, telecourses and live interactive educational broadcasts on behalf of the educational institutions. It assists the Colleges, Institutes and Universities to work together through its Learning Systems Working Groups and provides the framework for the problem-solving necessary for a cooperative Provincial "Learning System".

Its subsidiary corporation, the Knowledge-West Communications Corporation, operates a broadband closed-circuit service that links five teaching hospitals and the universities with 2 way video, audio and data units. The Knowledge-West also acts as a Developmental Directorate for new ventures in closed-circuit satellite video-conferencing, data networks and electronic publishing.

During 1982-83 over 8,000 students enrolled in the colleges, institutes and universities for courses offered through the Knowledge Network. The Knowledge Network is a non-profit society with its own Board of Directors. It is funded by grants from the Ministry of Education and the Ministry of Universities, Science and Communication. It was the first full DBS (direct broadcast service) user of ANIK-C, Canada's powerful new generation satellite, launched by the space shuttle "Columbia" in December 1982. This ended a three year period of experimental use of the ANIK-B satellite.

3.3 The funding of Distance Education is also systemic. Financial resources from the government are allocated to the institutions for both program development and delivery. The community colleges are also funded to provide local learning centres. These resources have been "ear-marked" and discretionary as a means to seed the innovative approaches in the face of rapidly escalating base budgets for the more traditional campus-based models.

The three universities received $625,000 during 1982-83 to assist in the development of programs delivered using satellite telecommunications. A further $3,700,000 was available in 1982-83 for non-metropolitan programs many of which were delivered by Distance Education. Currently, the Provincial Government has instated a severe financial restraint program and 1983-84 funds are diminished.

However, in comparing these funds to the general purpose grant for the whole University system, it is clear that the financial support for Distance Education is miniscule compared to its potential social impact.

Table 3.2 UNIVERSITIES' GRANTS

	GENERAL PURPOSE GRANT	NON-METROPOLITAN* PROGRAM
1979-80	217,226,000	2,146,229
1980-81	239,612,000	1,000,000
1981-82	271,712,000	4,257,100
1982-83	292,651,000	4,339,000
1983-84	300,993,292	3,000,000

(*Does not include Open Learning Institute)

Table 3.3

	Open Learning Institute BUDGET
79-80	3,560,000
80-81	5,138,000
81-82	6,400,000
82-83	7,200,000
83-84	7,200,000

Table 3.4

Knowledge Network BUDGET
N/A
3,188,500
2,945,150
3,255,659
3,427,112

(It should be noted that as of 1979 the Ministry of Education was divided to form two Ministries: the Ministry of Education and the Ministry of Universities, Science and Communication. The above University figures reflect only the University aspect of post-secondary education. Both the Open Learning Institute and the Knowledge Network receive funds from both Ministries.)

It is very difficult to assess the true cost of the evolution of Distance Education in British Columbia. The early satellite experiments carried no charge for the satellite use and it was only at the transfer to ANIK-C in February, 1983 that the Knowledge Network had to assume commercial tariffs of $1 million a year for satellite usage.

In comparing student participation, again it is difficult to assess exactly which students are affected by new technologies. As with any emergent new pattern, there are still a variety of terms used to describe and quantify students. The following table includes the head-count for full time/part time students for the Universities and Open Learning Institute and the Continuing Education split which includes credit, non-credit and some Distance Education. (Universities Council, 1983)

Table 3.5 UNIVERSITY ENROLMENTS

1982-83	FULL TIME	PART TIME	TOTAL	CONT. ED.	OVERALL TOTAL
University of British Columbia	20,688	6,621	27,309	43,671*	70,980
Simon Fraser University	6,989	5,207	12,196	47,210*	59,406
University of Victoria	6,726	4,227	10,953	23,320	34,273
Open Learning Institute	0	3,913	3,913	3,913	7,826

* These figures show total student enrolment in Continuing Education courses, credit and non-credit.

Enrolment figures for the Universities' Distance Education programs specifically are shown in Table 2.1. Discrepancies reflect the problem of varying terminology and categories for description.

Table 3.6 : 1982-83 UNIVERSITY DISTANCE EDUCATION ENROLMENTS

	UBC	SFU	UVIC	TOTAL
Education	3,475	3,947	6,641	14,063
Nursing	380	70	307	757
Health Science	3,185	-	-	3,185
Arts & Science	-	*5,278	183	5,461
Public Admin.	-	-	531	531
Argiculture	825	-	-	825
Forestry	175	-	-	175
Social Work	-	-	204	204
Child Care	-	-	476	476
Fine Arts	-	-	161	161
Other	375	-	-	375
Total	8,415	9,225	8,503	26,143

* Mainly DISC Programs:

Because of the emergent and innovative nature of the new initiatives, it would be premature to attempt any cost analysis. However, it is clear that there is a disproportionate relationship between the increasing numbers of students served through new technologies and the less than 2% of the total budget allocated to the institutions for such service. This is a further indication of the potential impact of 'process' and information-based learning systems have on 'plant' based educational models. The blurring of the distinctions between traditional Distance Education and innovative use of technologies on campus further complicates such an analysis.

NOTE: The difficulties encountered in trying to develop this section for the Case Study are a significant indicator in themselves, of the rapidity of change in forms of student participation and the slowness of administrative process to identify the new patterns.

IV CHANGES IN CURRICULA

4.1 It is to be anticipated that, as the new technology is introduced into the learning environment, so the curriculum will be in some way changed or modified. As the medium of communication changes from direct face-to-face instruction in a classroom setting, to delivery by means of print packages, telecourses, audio or video-cassettes, or combinations of media, the 'message' or content of communication must be affected.

4.2 When educators and instructional designers were asked to comment upon the ways in which the new technology had made an impact upon the information communicated and the content of the curriculum, consistently, the response was that it does not or should not make any difference. In instances where instructors recognized that the 'medium' does affect the 'message' they found it difficult to specify in what ways the curriculum changes.

There seem to be two main reasons why this response was given by so many people. One possibility is that there really is no change effected by the transition from face-to-face communication to some mediated environment in terms of what is taught and what is learned. That is, that, given two students having similar characteristics (knowledge, experience, intelligence, motivation, learning style, etc.) taking the same course (eg. 3rd year Nursing) one on-campus in a regular classroom, the other off-campus by satellite telecourse, they would both finish knowing the same information and having an equal chance of success in a final examination. The same would be true for other students taking the same course presented in other delivery modes, e.g., a correspondence course, an audio-cassette program. This suggests that the knowledge is not affected by the process, the packaging or the skills attendant in the learning environment.

A second possibility is that the medium of delivery does actually change the curriculum and what is taught and learned, but that educators either resist acknowledgement of the fact, or have not yet understood clearly how that change takes place and what should be done about it. Probably, it takes time and experience of teaching by different Distance Education methods before patterns start to emerge in how the technology affects the curriculum. It may be that the 'product' or the content of the curriculum remains unchanged, but what changes is the 'process' of deriving understanding and knowledge. That is, that students - and instructors - are forced to learn new information-processing skills. The changes that take place are thus 'invisible', intangible and difficult to articulate. They are cognitive shifts that go on almost unconsciously as a means of adjustment to different stimuli.

Our understanding of mental processes and cognitive restructuring is not far in advance of the experimental stages presently and there are more hypotheses than there is evidence to support them. However, if it is the case that 'packaging' of information demands new skills by which information is extracted, as Salomon (1979) has suggested, that is, that technological advancement does affect the learning process, then it would be valuable for educators to understand how this works. It seems that technological changes take place more quickly than changes in our ability to understand them. This problem will need to be addressed more fully if educators are to keep pace with our present age of rapid technological expansion.

Consideration of the process of education and its purpose rests upon epistimological questions, that is, upon one's philosophy of knowledge and learning. Educators need to know what it is that is learned when learning has taken place; whether the transmission of facts, or 'bits' of information, or the skills by which knowledge may be discovered, or both.

4.3 Introduction of the new technology presents a tremendous challenge to educators and creates new roles for them. There are three basic elements in the traditional process of education: the instructor (who has knowledge/information), the student (who seeks knowledge/information), and the learning environment in which the two come together (the classroom, print). As new devices enter to change the learning environment, such as computer, television, and teleconferencing, so the interface between instructor and student is changed.

> Whatever new forms such challenges may cause to develop, one thing seems fairly certain; the traditional class role of the instructor as sophist controller, decider and purveyor of regulated amounts of information, will change radically. (Potter, 1981.)

4.4 Views of the Teachers

Those people involved in Distance Education programs, instructors, production teams and students, were asked to comment upon differences they perceived in the process and product of learning via a Distance Education mode, compared with learning in a classroom setting. Most were involved with use of satellite television delivered courses, with audio-conferencing for interaction.

Many of those involved, educators, instructional designers and students alike, commented that the Distance Education 'product' was improved, being better planned,

prepared, organized, structured and presented than the average lesson delivered in a regular class.

4.4.1 Instructors and program managers who had developed courses for delivery by satellite telecommunication were asked to comment upon the changes that take place in the curriculum when it is taken out of the classroom situation and prepared for television transmission. The four courses concerned were in Political Analysis, Computing, Personnel Management and Nursing.

Instructors were not entirely happy about the tremendous amounts of their time and energy that are necessary in preparing materials for a Distance Education course, which are far in excess of the efforts they would have to expend for an on-campus course. For a television program, content has to be planned in detail and timing of delivery known in advance. There were adjustments to be made in writing a 'script' as opposed to a lesson plan, becoming familiar with production studio techniques and learning how to project oneself on camera. Less 'ad-libbing', spontaneous comments, humorous interjections or last-minute changes seemed appropriate for this medium. All of these factors detract from the relaxed, natural, informal style of classroom interaction and may make instructors tense and anxious. However, the work involved in careful, detailed advanced preparation materials, which might include the use of interviews, role-play, discussions, graphics, video-inserts, demonstrations and so on, was seen as worthwhile in the long-run. The outcome was a superior product which could be subsequently sold or loaned to external sources, or incorporated into the instructor's regular classroom teaching. One problem here is that of 'ownership' of a learning package developed by joint efforts of several individuals or groups working as a team. This question of copyright of such materials and program is an issue of concern for Distance educators. Currently ownership is normally vested in the institutions.

4.4.2 Distance Education courses are often more varied and stimulating because a multi-media approach is taken, as opposed to the traditional stand-by of 'chalk and talk' in the classroom. The use of slides, film, colour graphics and stimulating visual material can increase both comprehension and levels of interest and motivation. Concepts can be visually illustrated on television more readily than in the classroom, as opposed to being merely described. Access to the services of a professional graphics artist means that more professional and imaginative images can be shown. The interactive aspect means that there is still a teaching dynamic and the knowledge, though fully planned, is not "frozen" on video-tape.

4.4.3 Distance Education projects present new challenges to faculty, and generally attract those faculty members who are competent and willing to accept the challenge. Few instructors are forced to participate against their will, rather, they have a commitment to Distance Education, a caring for the needs of students who are less well-served educationally, and a willingness to participate. Further, the Distance Education system, especially where television programs are involved, is an 'open door'system where instructors expose themselves to the critical attention of their colleagues and the public. Such a system demands and often produces excellence in instructors and instruction. One problem area in this connection, however, is that instructors at the college and university level are often not trained as teachers and therefore they lack an understanding of the fundamental processes of instruction. Because professors are generally content specialists rather than educators, lack of teacher-training may make the task of adapting to new media and methods of instruction all the more difficult to accomplish.

4.4.4 There is a greater degree of individualizaton of instruction in the Distance Education mode in that students generally work alone, regulating their own learning activities without the structuring of classroom attendance. Control of the educational task is delivered into the hands of the student; the model is one of student-controlled learning rather than teacher-controlled learning. This can have the effect of being both liberating for the learner, offering a degree of freedom and power never before experienced in the educational system, and also intimidating, for one is thrown back on one's own resources. Frequently, the point was made by respondents that learning is a form of human communication; it is a social phenomenon, and interaction with other people is an essential part of the learning process. We have the means to make access to information readily available to students, by electronic media or by print, but the element of human interaction must also be built-in to the delivery system for learning to take place. Instructors need responses from students, verbal and non-verbal before they can know whether they have been understood.

Students need to converse with instructors and peers to share ideas and problems and to articulate their knowledge. Methods of providing for interaction include the use of tutors, study groups, 'study-buddies', local experts, telephone, and more recently, audio-teleconferencing, video-teleconferencing and computer links. Increasing use is being made of interactive media in distance education to compensate for the 'missing link' in the communication process. The use of inter-activity involving telephone, either through audio-conferencing or linked directly to live

telecasts provides the structure of a "class" as well as a form of immediate feedback albeit over a classroom of almost a million square kilometers.

Because students are isolated, separated from instructor and peers by distance, often working at home alone, it is necessary for instructors to supply ample support materials giving precise information and guidance and specifying learning objectives. This is welcomed by students, although it is recognized that the arrival of a thick, wordy volume of learning materials can also be intimidating, especially to people who have been away from the educational field for some time. Instructors have to anticipate potential problem areas and either give clear explanations, or even omit very complex topics.

There is little opportunity for students to organize themselves in discussion groups and this is a disadvantage especially in 'issues' courses where exchange of personal opinions and experiences and attitude change is an essential component. It is also difficult to do work of a practical, experimental or problem-solving nature in the Distance Education context. Some of the most innovative experimental work using the Knowledge Network's live interactive system has been in the linking of groups for discussion and problem-solving. The growth of audio-conferencing is a further extension of the movement to provide direct contact among groups.

It has been stated earlier that changes in the system of communication changes the interface between instructor and students. The medium of television alters that relationship in several respects. Students at a distance are likely to be more critical of a 'face on a screen' than the live person in the classroom, and it is much easier to literally switch off if you do not like what you see. Therefore it is particularly important for the instructor to project their personality on television. Also, students see their television instructor in a number of roles: as an interviewer, an expert, an illustrator, a professional, as well as a teacher. Further, instructors may address their Distance Education students in a rather different way from the younger university class, for these people are adults and fellow professionals, with experience of working in the field, hence they will be regarded as 'peers' as well as students.

4.5 Views of the Learners

Interviews with students revealed noticeable individual differences relating to preferred methods of educational delivery. Some preferred to be on-campus with easy access to

people and resources to Distance Educuation methods. They found it difficult to concentrate on serious study at home with distractions from family, friends, and telephone calls. Others preferred to learn in the comfort and convenience of their own home away from the anxiety-inducing classroom environment. They appreciated being able to work at their own pace, and to revise materials in the form of printed notes or video-recordings of televised programs. They were able to make use of support services offered in the form of telephone conversations with instructors, interactive television, library extension services, and in some instances, local study groups. Many distance learners have no choice but to learn at home, being unable to attend college or university because of constraints of time, distance and work or family responsibilities. Others living nearer to educational centres do have a choice, and some of them are choosing to stay at home to learn. It seems that home-study is gaining in popularity.

A frequent comment made by Distance Education students was that they had to work hard for the credit they earned. The Distance courses were found to be academically rigorous in terms of both quality and quantity of content, and of standards expected of students' work. Time and time again, students commented on the superior quality of their materials, and how helpful it was to have a complete, well-ordered and presented package from which to learn.

4.6 The implementation of a technological system seems to affect the curriculum in a number of principal respects.

1. The Distance Education product is more structured and detailed.

2. The bulk of the learning material is supplied in the print package. Highlighting of key points is done by the instructor, in the print materials and in the television presentation. Other technologies are used for interaction.

3. Comprehension problems are anticipated and very complex topics may be omitted.

4. It is difficult to do practical or problem-solving work although novel new methods are being experimented with primarily through inter-active television.

5. Sophisticated graphics can be produced with the aid of a professional graphics artist and use of technology e.g. computer graphics. This provides an important visual dimension to the teaching of complex subjects.

In summary, it appears that the change of the medium of delivery does make a difference to the content of the curriculum, but that this area is not yet clearly understood. It is not necessarily that the medium affects the message, for generally the same information is transmitted regardless of medium, but that it changes the process of communication in terms of the mental skills needed to understand the message, and the relationship between the participants.

It seems that the Distance Education 'product' has been refined to the stage where both instructors and students are content with the high quality, but that the 'process' of learning via a Distance Education mode is lacking, particularly in the area of natural, spontaneous human interaction. More interactive communication media are now being used to allow for the free and spontaneous exchange of ideas amongst teachers and learners and it is this area which is of great interest in British Columbia's use of new information technologies.

The coming of the new technology presents new challenges for educators and changes the nature of their task. There is a need for educators to reassess and redefine their roles, to be open to adaption, and to, themselves, be prepared to learn. The kind of educational system that is emerging in British Columbia is one of a mutually dependent community of teachers and learners, sharing ideas, knowledge and expertise.

THE TEACHING/LEARNING ENVIRONMENT

5.1 Views of the Teachers and Learners

For the purpose of this Case Study, interviews were conducted with personnel concerned with Continuing and Distance Education in B.C., that is, administrators and instructors working within the Universities and Institutes and Government Ministries. The purpose of the interviews was to ascertain the understanding of and concerns about the "Learning System" as it exists at the present time amongst those people who are a part of that system and whose daily work has contributed or is contributing to its development. A summary of the principal findings of those interviews is as follows.

There was general agreement that British Columbia is in the vanguard of Distance Education projects and use of new technology, particularly satellite telecommunications for educational programming. British Columbian institutes for Continuing and Distance Education have been responsible for the production of programs that are considered impressive in terms of both quality and quantity, and this had been accomplished in the space of only a few years.

Some issues of concern to those involved in the "Learning System" were apparent. There is a lack of adequate needs assessment being undertaken. Doubts were expressed regarding whether program offerings are really relevant to the needs and interests of the learner. There was a certain degree of concern that decisions regarding educational provision are politically based, not educationally based. A "Learning System" can all too easily become self-serving instead of existing to serve the needs of the consumer. (opinions expressed by respondents).

Courses may be offered simply because there is faculty able and willing to run them, rather than because there are indications that students need them. All too often, the student voice is not heard. In particular, there is a lack of educational provision for those who have most need, such as the under-educated and those in socio-economic need. There is a tendency to provide further education for those who already have it. An area to be addressed is the provision of Adult Basic Education to enable learners to re-enter the system.

A special area of need is in Adult Special Education to provide for the physically handicapped and institutionalized students. Use of sophisticated technology can help the handicapped to overcome their communication problems. Other areas of course development are English as a Second Language and the tutoring of new Canadians.

The importance of human interaction in the learning process has already been noted. Those people interviewed reinforced the necessity to provide opportunity for personal contact and interpersonal communication, particularly where the new information technology is used, so that a dehumanized, mechanistic learning environment is avoided. A 'small scale' model ensures a learning system that is responsive to people's needs.

Inter-institutional co-operation and co-ordination is essential now that the "Learning System" is becoming increasingly complex and technological. Mobility and interchangeability of personnel, knowledge, programs, students and credit should be increased. A credit banking system chould be introduced where credit is given for work and life experience, as well as for educational experience. The mechanism for such a credit banking system is already in place. What is needed is a common agreement amongst the academic and professional institutes involved to implement the system.

There needs to be increased co-operation amongst educators, instructional designers and media producers; a willingness to share knowledge and expertise and an openness to learn. The worlds of educators and technologists are far apart and the gap between them needs to be bridged. Instructors would benefit from training in the use of educational technology and instructional design for Distance Education. The majority of instructors are content specialists who are not teacher-trained and this poses a problem for the production team. A project team approach is advocated where the instructor works in consultation with media experts and an instructional designer. Faculty members should be given 'release' time and benefits for involvement in Distance Education projects.

Concern was expressed that technology be put tc appropriate use. A delivery system should never be utilized simply because it is available. Attention should be given to the appropriate choice of delivery medium based on the material, the context, the student and the instructor. The best medium of delivery may be the simplest one, such as radio or audio-cassettes. The wide choice of technologies available in British Columbia make this an even more urgent concern.

Financial and political support for Distance Education, non-traditional delivery systems and lifelong learning is essential for the continued existence and well-being of the Learning System. B.C. has enjoyed political commitment to Distance Education in the past and this has enabled the present system to flourish. Continued financial assistance is imperative in the future and public pressure could be

brought to bear on government to ensure adequate funding in the future. This assumes public awareness of the issues.

The present social and economic situation is a mutable one and the "Learning System" needs to be responsive to external developments and changing needs. Universities tend to be conventional, conservative institutions that are slow to adapt. Also, there is competition from the private sector in the provision of professional training. Crown corporations, Government Ministries, business and private schools all offer training programs to employees, so that educational establishments no longer have a monopoly. The "Learning System" will have to ensure that its services are in keeping with the real needs of the populace in order to survive into the future.

A balance should be found between creation of original programs in British Columbia and the borrowing and adaptation of existing programs from elsewhere, for example, Great Britain and the United States. Production of original programs is expensive, especially where high-level, specialized, rather than mass introductory courses are concerned, and it is often more economical to purchase existing products. There is a danger of losing the Canadian and British Columbian experience if too many imported programs are used.

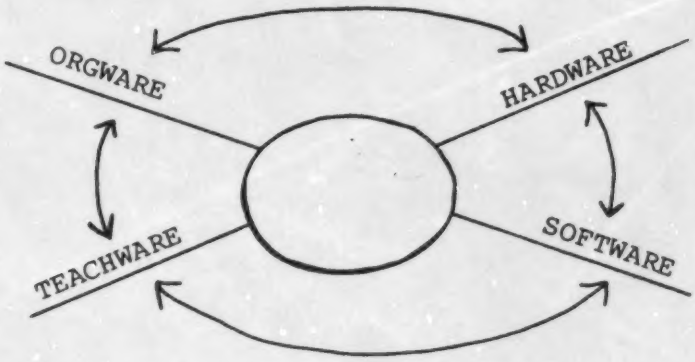
Continuous assessment needs be made of the cost-effectiveness of delivery systems and attempts made to maintain a learning system that is not wasteful of money or resources. Duplication of effort should be avoided. Distance Education programs have higher development and lower delivery costs over time than on-campus courses. However, 'air-time' is expensive and limited and future telecourses are likely to contain a shorter live interactive component.

One major need is the development of accurate information on development and delivery costs and the development of common strategy matrices so that there will be a common framework for decision making within the institutions comprising the "Learning System".

5.2 Changes In Institutional Structure

One of the key organizing principles for the integration of innovation into an existing system was postulated by the Russian engineer, Dubrov (Tribus, 1979). This model has been used deliberately in British Columbia in the implementation of the Knowledge Network and offers a framework for reviewing the study.

Table 5.1 Dubrov's model



This study has described the variety of hardware technology being currently used. The Distance Education courses described represent the software. The many practioners have recently formed a Coordinating Committee for Distance Education to provide the teachware. The key element to this study has really been the orgware - defined as the "organizational changes necessary to integrate the innovation".

All these aspects were considered in integrating the experimental use of satellite telecommunications into the higher education environment so that its use would be seen as an extension of the educational environment and not a separate, incremental activity.

5.2.1 As the new information technology is introduced, changes can be expected in the internal and external functioning and the policies of the educational institution at the points were it interfaces - i.e. the teaching and the learning environments and the teachers and learners.

It is recognized that there is a need for change to occur within traditional learning environments in their philosophy and orientation towards education, to accommodate developments in technology and instructional methodology. However, it has been noted that educational establishments tend towards conservation and they are often slow to adapt and respond to a changing environment. There is evidence of

resistance to change in some quarters of the "Learning System" in British Columbia. This is compounded by significant shifts in the provincial economy and resulting feelings of job insecurity by faculty and other staff.

Educational establishments are coming under pressure to respond to the changing needs of post-industrial society. Major technological developments including the advent of the computer are revolutionizing the face of society in the 1980s. People now can expect to hold down two or even three different careers in one lifetime; and the nature of work has changed in keeping with a 'high-technology' world. Women have 'entered the market place' in significant numbers. Attitudes to work, to leisure and to education continue to change. Demographic patterns are having an effect, as a decline in high-school graduates is being experienced, which is not expected to pick up for another decade.

Competition amongst universities is keen, and universities are now faced with external competition from the private sector. Universities cannot afford to remain as 'ivory towers' serving an elite. If the university is to serve the people in a democratic way, government subsidies will be needed so that special education courses can be developed where the user cannot pay for services. Such special programs might serve the needs of such groups as the unemployed, Native Indians, new immigrants to Canada and handicapped adults. However, Universities in a small population area cannot afford to compete with each other. They must find areas for each to offer services and any competition must be a competition for excellence in the delivery of those services.

There is an increasing need for students to take control over their learning and to become independent learners. Teaching is less a matter of straightforward 'lecturing' and more the provision of access to information and guidance. Technological developments in hardware and software and changes in instructional design have enabled educational institutions to meet the changing needs of its clientele. Universities have had to become more open and accessible.

Educational policy needs to be more flexible, specifically in admission policy so that students are not debarred from educational opportunity because of a lack of academic qualifications. The typical Distance Education student cannot be expected to meet all the entrance requirements of the university, so allowances have to be made. There is evidence that admissions policies are becoming increasingly flexible to accommodate the needs of Distance Education students.

It is necessary for there to be understanding of the requirements of Distance Educational programs amongst the personnel responsible for the physical plant of educational establishments, such as print and television services. There appears to be increasing recognition of the importance of Distance Education activities throughout the administrative hierarchies of some of the institutions, and it is hoped that administrative commitment to Distance Education projects will continue to grow.

It was suggested by several of the people interviewed for the purpose of this Case Study that greater decentralization of the "Learning System" is desirable, with expanded use of regional support services. Local small-scale units of operation are more manageable, responsive to change and more human. The beginning of a network of learning centres operated by the community college may will provide this local, human scale.

5.2.2 A need for increased collaboration amongst participants in the "Learning System" is perceived. The Learning Systems Working Groups (LSWG) perform an important function in ensuring that collaborative efforts are made. The LSWG's are formed by a member from each community college, five institutions, and the three universities. They meet regularly to carry out their mandate which is done in the absence of any formal agreements.

The mandate is to assist in program development; to act as a forum for the determination of standards of levels of support; to act as a vehicle for the development or acquisition of television programs; to develop short-and long-term plans for the LSWG and the Knowledge Network; and to act as a vehicle for the dissemination and sharing of information between the LSWG members and the Knowledge Network. In short, these groups are problem-solving forums directly involved with the working of the "Learning System".

The Knowledge Network plays an important role in Learning Systems Development. By not being an institution and by remaining a small dynamic network who must work in co-operation with the educational community, the Knowledge Network plays a useful role in assisting British Columbia's educational system to react more rapidly to societal change.

The Knowledge Network takes a system-wide view and anticipates and encourages change in policy at the policy, programming and interpretive decision levels in both government Ministries and the Institutions. The system of Learning Systems Working Group reflects the grouping for consensus and problem-solving of institutional representatives at specific decision-making levels to deal with problems created by the 'transparent' nature of a telecommunications network which exists on their behalf.

This 'clustering' of such 'nodes' allows system-wide impact to be effected among individual and autonomous institutions. Using the decision-band method (DBM), groups can learn to identify the level of decision and who should be involved to make the commitment (Paterson, 1981). Although gradual, the growth in the Learning Systems Working Group is moving towards self-organizing governance of the "Learning System". (Forsythe, 1983).

The Knowledge Network also acts as the advisor to the Ministries on the financial needs of the delivery system. It is not funded itself to program the networks it operates so must persuade the institutions to choose to use the new technologies in order for it to survive. This creative tension has been a key factor in the emergence of the idea of a co-operative provincial "Learning System" made up by the participation of individual institutions.

Although at this time the Knowledge Network is still seen as an alternate delivery mechanism and basically incremental to most institutions, with the opening of the Knowledge-West Closed Circuit Cable Service and the development of new "Learning Systems", the Network and the Universities, together, have the potential to provide long-term integral change both to the provision of learning on campus, as well as to the rest of society. Telecommunications provides a means to create the 'transparent university' in which research, teaching and consultancy are fully integrated and opened out to society at large.

VI CONCLUSION

6.0 In preparing this Case Study many views and perspectives were elicited. One very clear, common impression was a feeling of excitement and a sense that 'something is happening' in British Columbia.

We have attempted to chronicle the emergence of a Province-wide educational delivery system, which makes use of a variety of technologies, chief of which is the telecommunications satellite. Whether it will truly emerge to fulfill the vision of the "Learning System" remains to be seen as the decade unfolds. At least the idea has begun to exist and there are indicators of its establishment throughout the system.

Certainly, the numbers of educators in post-secondary institutions in B.C. involved in Distance Education using new information technology has risen exponentially in the last five years and surely must be higher and more widespread than in any comparable socio-geographic area. (See Table 2.3.2).

6.1 Similarly, the availability and use of a wide variety of technologies including satellite, broadband cable for video, audio and data conferencing is spreading rapidly and every post-secondary institution is involved in some level. In interviewing the practitioners we were struck by a number of common responses in B.C.

1. When educators and instructional designers were asked to comment upon the ways in which the new technology had made an impact upon the information communicated and the content of the curriculum, consistently, the response was that it does not or should not make any difference to the content or knowledge.

   It seems that technological changes take place more quickly than changes in our ability to understand them and their human impact. This problem will need to be addressed more fully if educators are to keep pace and if the technologies are to be used wisely and appropriately.

2. Although instructors were not entirely happy about the tremendous amounts of time and energy needed to plan courses for new forms of delivery, they all seemed to agree that the educational 'product' was improved, being better planned, prepared, organized, structured and presented than the average lesson delivered to a class.

   Although this demands and often produces excellence in instructors and instructions, one problem is that educators at the University level are often not

trained as teachers and therefore they lack an understanding of the fundamental processes of instruction. Lack of educational training may make the task of adapting to new media and methods of instruction all the more difficult.

3. Instructors are concerned about interaction in the teaching/learning process. However, students seem quite comfortable with the new choices offered them. They repeatedly commented on the superior quality of the learning materials. It is clear that the relationship between the instructor and the technology and the student and the technology is different, with probably the instructor in the most challenging and vulnerable position. The interfaces in these relationships seem to be a key area for further investigation.

6.2.0 On a system level, the current situation in British Columbia reflects a number of other interesting trends and emergent patterns.

1. Increasing inter-institutional co-operation. Using the organizing principle of 'co-operative individuality' institutions in British Columbia are striving to find ways to work together while retaining their autonomy and distinct uniqueness.

2. Increasing involvements of adults of all ages in less traditional learning opportunities.

3. Disproportionally small amounts of funding to support these less traditional activities.

4. Increasing use of technological 'networking' in video, audio and computer as a complement to the human networks. This use of 'connection-making' technology supports the move to increased co-operation and the move to smaller, human scale involvement linked together by technology. In the last two years, most Distance Educators have moved to the use of audio-conferencing for administration and planning and are now interested in computer conferencing.

5. Small but significant shifts in organizational structure in support of the new systems.

6. Small but growing tendency to use materials and technology designed for Distance Education, in the campus environment and a blurring of distinction between the methods of course delivery.

The emergence of the new closed-circuit cable network among the universities (operational Oct 1, 1983) and teaching hospitals offers to add further dimensions to the complex environment in British Columbia. A second closed-circuit satellite service is in development. There are a number of data networks in operation. The test of the emergent "Learning System" model will be its flexibility as an organizing principle for each new phase of technological innovation. In this way, the various technologies should become invisible and their uses should provide new human and social opportunities for the learning continuum.

"The network is the institution of our time, an open system, a human web, capable of endless tranformations..." (Marilyn Ferguson, The Aquarian Conspiracy, 1980.

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